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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
BAUM, STUART F	

ART UNIT	PAPER NUMBER
1638	

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Applicati n N .	Applicant(s)	
	09/995,917	CHORY ET AL.	
	Examiner	Art Unit	
	Stuart F. Baum	1638	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *24-26* is/are withdrawn from consideration.

5)☒ Claim(s) *27 and 28* is/are allowed.

6)☒ Claim(s) *1-5,8-13,and 15-22,* is/are rejected.

7)☒ Claim(s) *6,7,14 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Claims 1-28 are pending.

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-23, and 27-28 are drawn to a method of producing a genetically modified plant having increased size compared to a wild-type plant and a genetically modified plant, both of which comprising a nucleic acid molecule of SEQ ID NO:3 encoding a polypeptide of SEQ ID NO:1, classified in class 800, subclass 290 for example.

   II. Claims 24-26, are drawn to a purified polypeptide of SEQ ID NO:1 , classified in class 530, subclass 370 for example.

3. Inventions I and II are unrelated to each other because nucleotide sequences either encoding different proteins or specifying specific expression patterns are structurally distinct chemical compounds and are unrelated to one another, as are different proteins structurally distinct chemical compounds and unrelated to one another. These sequences are thus deemed to normally constitute independent and distinct inventions within the meaning of 35 U.S.C. 121. Absent evidence to the contrary, each such sequence is presumed to represent an independent and distinct invention, subject to a restriction requirement pursuant to 35 U.S.C. 121 and 37 CFR 1.141 et seq (see MPEP 803.04 and 2434). This requirement is not to be construed as a requirement for an election of species, since each nucleotide and amino acid sequence is not a

member of a single genus of invention, but constitutes an independent and patentably distinct invention.

4. Inventions I and II are distinct from each other because the starting materials, method steps and end products are distinct and unrelated to each other. Furthermore, the proteins of Invention II could be made by a process other than the expression of the gene of Inventions I such as chemical synthesis or purification from the natural source, and the DNA of Invention I may be used for a process other than the production of a protein, such as a nucleic acid hybridization. Lastly, DNA and protein differ in composition, structure and function.

5. Because these inventions are distinct for the reasons given above, have acquired a separate status in the art as shown by their different classification, and the literature and sequence searches required for each of the Groups are not required for another of the Groups, restriction for examination purposes as indicated is proper.

6. Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

8. During a telephone conversation with Jim Mullen on 8/13/02 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-23, and 27-28. Affirmation of this election must be made by applicant in replying to this Office action. Claims 24-26 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

9. Claims 1-23 and 27-28 are examined in the present office action.

Specification

10. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See for example page 36, line 4. See MPEP § 608.01.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-5, 8-13, and 15-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, the metes and bounds of "DAS5" have not been defined. Applicant has not specified what is encompassed in the recitation "DAS5 protein". Is "DAS5" synonymous with SEQ ID NO:1 in all instances?

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: "allowing said nucleic acid sequence to be expressed", before the step of selecting a plant exhibiting increased size.

In claims 1, 8, and 17 the metes and bounds of "increased size" have not been defined. Applicants only present results in Table 2 (page 31) in which the mass of transformed plants is greater than non-transformed plants. Does Applicant mean that the transformed plants are taller? Applicant needs to explicitly state what characteristics of the plant are changed in comparison to the non-transformed plant.

In claim 1, the word " contacting" should be replaced with "transforming".

In claims 2 and 3, the word "contacting" should be replaced with "transformation".

In claim 4, the metes and bounds of "gamete producing cells" and "cells which regenerate into whole plants" has not been defined. Given the lack of definition for these terms, it is suggested by the Examiner to simply delete claim 4. The Examiner believes there is no need to further limit the scope of the "plant cells" of claim 1.

In claims 8 and 17, the word "homology" should be replaced with "identity".

In claims 9-11, and 18-20 the word "homology" should be replaced with " sequence identity".

In claims 9-11, the word "sequence" should be inserted after the word "acid".

In claims 12 and 21, second line, the word "operably" should be inserted after the word "is".

In claims 13, 18-20, and 22, the word "sequence" should be inserted after the word "acid".

Written Description

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claims 1-5, 8-12, and 15-21, rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to a method of producing a genetically modified plant comprising transforming a plant cell with a nucleic acid encoding a DAS5 protein, or a genetically modified plant or plant seed both of which comprise a nucleic acid molecule encoding a DAS polypeptide wherein the polypeptide comprises an amino acid sequence exhibiting at least 80%, 85%, 90% or 95% sequence identity to SEQ ID NO:1.

The specification only discloses the nucleic acid sequence of SEQ ID NO:3 encoding a DAS5 protein of SEQ ID NO:1 but does not disclose any specific structural, physical and/or chemical properties for the claimed polypeptide of SEQ ID NO:1 or for any DAS5 proteins. Applicants do not present a description of domains that are specific to SEQ ID NO:1 or any DAS5 protein nor domains that are important for the protein's proper function. Given the lack of description, one skilled in the art would not be able to identify sequences with less than 100%

sequence identity that still maintained the proper activity. The claims recite 80%-95% sequence identity of SEQ ID NO:1, but Applicants have not disclosed a representative number of species as encompassed by the claims. The claims encompass mutants and allelic variants and thus imply that structural variants exist in nature, yet no structural variant has been disclosed. The implication is that there is a gene and a protein other than that disclosed which exists in nature, but the structure thereof is not known. Thus, there is insufficient relevant identifying characteristics to allow one skilled in the art to predictably determine such mutants and allelic variants from other plants and organisms, absent further guidance.

Therefore, the written description requirement is not satisfied. Therefore, one skilled in the art would not recognize from the disclosure that Applicant was in possession of the claimed invention. (see Written Description Requirement published in Federal Register/Vol.66, No. 4/ Friday, January 5, 2001/Notices; p. 1099-1111).

Scope of Enablement

13. Claims 1-5, 8-12, and 15-21 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for claims drawn to a method of producing a genetically modified plant, a genetically modified plant and genetically modified plant seed comprising transforming a plant with a nucleic acid molecule encoding a DAS5 polypeptide of SEQ ID NO:1 encoded by SEQ ID NO:3, does not reasonably provide enablement for a method of producing a genetically modified plant, a genetically modified plant and genetically modified plant seed comprising transforming a plant with any nucleic acid encoding any DAS5 polypeptide or a DAS5 polypeptide exhibiting 80%, 85%, 90% or 95% sequence identity to SEQ

ID NO:1. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claimed invention is not supported by an enabling disclosure taking into account the *In re Wands* factors (858F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). *In re Wands* lists a number of factors for determining whether or not undue experimentation would be required by one skilled in the art to make and/or use the invention. These factors are: the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples of the invention, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claim.

Applicants isolated their invention from *Arabidopsis* plants that had been mutagenized with an activation tagging vector (page 34, 1st paragraph). Primary transformants were screened directly for an overall larger size as compared to control plants. The *das5-D* (dominant) mutant was selected for further examination due to its altered phenotypic characteristics: larger rosette leaves, longer petioles, and taller peduncles (page 35, 1st paragraph). Applicants plasmid rescued the nucleic acid encoding sequence from the dominant mutant phenotype and verified that the rescued sequence was responsible for the mutant phenotype by transforming *Arabidopsis* plants with said sequence (page 36, Example 4 and page 38, Example 7).

It cannot be predicted by one of skill in the art that nucleic acids that encode a polypeptide exhibiting 80%, 85%, 90% or 95% sequence identity to SEQ ID NO:1 will encode a protein with the same activity as SEQ ID NO:1. Bowie et al (1990, Science 247:1306-10) teach

that an amino acid sequence encodes a message that determines the shape and function of a protein and that it is the ability of the protein to fold into unique three-dimensional structures that allows it to function and carry out the instructions of the genome. The cited reference also teaches that the prediction of protein structure from sequence data and, in turn, utilizing predicted structural determinations to ascertain functional aspects of the protein, is extremely complex (pg 1306, left column). Bowie et al teach that while it is known that many amino acid substitutions are possible in any given protein, the positions within the protein's sequence where such amino acid substitutions can be made with a reasonable expectation of maintaining function are limited. Certain positions in the sequence are critical to the three-dimensional structure/function relationship, and these regions can tolerate only conservative substitutions or none at all (pg 1306, right column). The sensitivity of proteins to alterations in even a single amino acid in a sequence is exemplified by McConnell et al (2001, Nature 411 (6838):709-713), who teach that the replacement of a glycine residue located within the START domain of either the PHABULOSA or PHAVOLUTA protein receptor with either an alanine or aspartic acid residue, alters the sterol/lipid binding domain. This change renders the protein constitutively active and therefore creates a dominant mutation which has a drastic alteration in phenotype compared to wild-type *Arabidopsis* plants.

The state-of-the-art teaches that because of the unpredictable nature of plant transformation, one of skill in the art cannot reasonably generate transformed plants with a desired phenotype using a specific isolated gene. Levels of transgene expression in plants are generally unpredictable and vary between independent transformants; this variability is usually explained by differences in transgene copy number and/or integration site (Finnegan and

McElroy, 1994. Bio/technology 12: 883-888 pg. 883 2nd paragraph) Eshed et al (2001, Current Biology 11:1251-1260 pg 1255 2nd paragraph) documented the phenotypes of plants transformed with the 35S CaMV promoter fused to the *KANADI1* gene, which is a gene normally expressed in tissues located on the bottom side of young developing leaves. Of the 30 plants that were transformed with the *KANADI1* gene, 23 plants developed only small narrow cotyledons and an arrested meristem, three produced a few radialized leaves and four appeared normal. These results suggest that transforming plants with an endogenously expressed gene in regions of the plant in which it is not normally expressed produces highly unexpected and unpredictable results. For one skilled in the art, undue experimentation would be necessary to produce a plant with a desired phenotype

Applicants are claiming a method, transgenic plants and transgenic seeds, all of which are reported to produce a plant with a larger mass because of the introduction of a nucleic acid that encodes a polypeptide of SEQ ID NO:1, into the plant. Applicants also specify sequences that are used in the method, transgenic plant and transgenic seed that exhibit less than 100% sequence identity to SEQ ID NO:1. The state-of-the-art teaches that even within a gene family in which characteristic and functional domains are conserved, protein function is not conserved. Zhao et al (2001, Science 291 :306-309) teach that not all YUCCA-like genes have identical effects when overexpressed in plants. BAS3 which is a member of the YUCCA gene family and has 50% and 63% amino acid identity with YUCCA and YUCCA3, respectively produces plants with long hypocotyls when overexpressed in plants. This phenotype is in contrast to YUCCA, which produces plants with short hypocotyls when overexpressed as a dominant mutant (page 308, left column, 1st paragraph).

Given the unpredictability of identifying and transforming a plant with a nucleic acid encoding a polypeptide exhibiting 80%, 85%, 90% and 95% sequence identity to SEQ ID NO:1 that still maintains the same function as SEQ ID NO:1 when transformed into a plant for the reasons stated above; given the lack of guidance and examples for identifying a nucleic acid sequence encoding a polypeptide exhibiting 80%, 85%, 90% and 95% sequence identity to SEQ ID NO:1 that still maintains the same function as SEQ ID NO:1 when transformed into a plant for the reasons stated above; given the state-of-the-art and breadth of the claim, it would require undue experimentation by one skilled in the art to make and/or use the broadly claimed invention.

14. Claims 27 and 28 are allowable. Claims 27 and 28 are deemed free of the prior art, given the failure of the prior art to teach or reasonably suggest an isolated polynucleotide of SEQ ID NO:3, encoding SEQ ID NO:1.

15. Claims 6, 7, 14 and 23 are objected to for depending on a rejected base claim.

16. Claims 6, 7, 14 and 23 would be allowable if written in independent form including all the claim limitations.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stuart Baum whose telephone number is (703) 305-6997. The examiner can normally be reached on Monday-Friday 8:30AM – 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson can be reached on (703) 306-3218. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3014 or (703) 305-3014 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, who may be contacted at 308-0196.

Stuart F. Baum Ph.D.

March 6, 2003

PHUONG T. BUI
PRIMARY EXAMINER